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Specification

Amended versions of paragraphs [0017] and [0072] of the Specification are set forth below:

[0017] Figure 1 is a schematic side view of the structure of a conventional GaN-based layer structure from which conventional nitride semiconductor lasers can be made.

Figure 2 is a graph showing the far-field pattern of the light emitted by an example of a laser made from the conventional layer structure shown in Figure 1.

Figure 3 is a schematic side view of a first embodiment of a nitride semiconductor laser structure according to the invention.

Figure 4 is a schematic side view of a nitride semiconductor laser according to the invention fabricated from the nitride semiconductor layer structure shown in Figure 3.

Figure 5 is a graph showing the far-field pattern of the light emitted by an example of a nitride semiconductor laser according to the invention fabricated using the nitride semiconductor layer structure according to the invention.

Figure 6 is a graph showing the forward characteristics of an example of a nitride semiconductor laser according to the invention (curve (a)) and a comparison laser (curve (b)).

Figure 7 is a graph showing the threshold characteristics of an example of a nitride semiconductor laser according to the invention (curve (a)) and a comparison laser (curve (b)).

Figure 8 is a schematic side view of a second embodiment of a nitride semiconductor laser structure according to the invention incorporating an additional AlN composite layer.

Figures 9A-9C are graphs showing different ways in which the AlN molar fraction of the composite AlGaIn layer can vary through the thickness of the composite AlGaIn layer.

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Figure 10 is a schematic side view of an embodiment of a nitride semiconductor layer structure in accordance with the invention that incorporates a substrate structure.

[0072] Sapphire substrates, as used as the substrate 41 of the layer structure 40 and the laser 60, are well-researched and inexpensive. Alternatively, silicon carbide (SiC) can be used as the substrate 41. SiC is a more expensive substrate material, but has a lower resistivity, is more stable, and has superior cleaving properties. As a further alternative, a conductive substrate of GaN can be used and provides excellent performance. Moreover, a substrate structure composed of a layer of GaN deposited on a substrate can be used as a conductive substrate. Such substrate structure may additionally include a buffer layer of low-temperature-deposited nitride semiconductor material between the substrate and the layer of GaN, as Figure 10 shows an embodiment 100 of a nitride semiconductor layer structure in accordance with the invention and incorporating an example of such a substrate structure. Elements of the nitride semiconductor layer structure 100 that correspond to the nitride semiconductor layer structure 40 described above with reference to Figure 3 are indicated using the same reference numerals and will not be described again here. The nitride semiconductor layer structure 100 includes the substrate structure 102 composed of the substrate 104, the layer 106 of GaN and the buffer layer 108 of low-temperature-deposited nitride semiconductor material between the substrate 104 and the layer 106 of GaN. The substrate structure 102 is disclosed in Japanese Patent Application H9-306215 and United States patent no. 6,537,513, which claims priority of Japanese Patent Application H9-306215. Japanese Patent Application no. H9-306215 was This application is assigned to the assignee of this disclosure, and is incorporated into this disclosure by reference. An English language version of this application is published as International Application no. WO 99/25030. Other substrate materials that can be used include spinel, MgO, GaAs, silicon, etc.